Commonwealth of Pennsylvania

DEPARTMENT OF AGRICULTURE
DAIRY AND FOOD BUREAU

BULLETIN No. 272

TOMATO KETCHUPS

ANALYSES MADE BY

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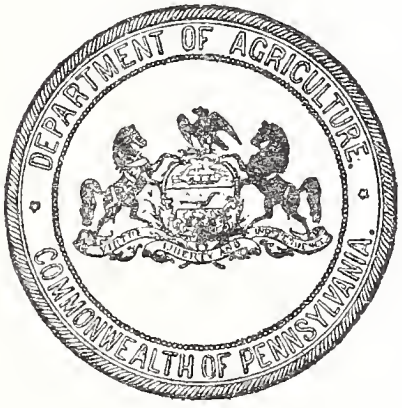

CHAS. E. PATTON, *Secretary of Agriculture*

JAMES FOUST, *Dairy and Food Commissioner*

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PREFACE

In view of the great and growing consumption of Tomato Ketchup by the people of this country, the question of the wholesomeness of this product is of interest to every citizen. The following report, covering a wide range of Tomato Ketchup, such as are found in almost every family is, therefore, made, and authorized to be printed as a Bulletin of this Department for the information of the public.

CHAS. E. PATTON,
Secretary of Agriculture.

LETTER OF TRANSMITTAL.

Harrisburg, Pa., *December 1, 1915.*

Hon. CHAS E. PATTON, Secretary of Agriculture:

Dear Sir: I have the honor to submit herewith a report by Professor Charles H. LaWall, Chemist to the Dairy and Food Bureau of the Department of Agriculture, presenting the results of a recent investigation upon the quality, as respects conformity to the Food Act of May 13th, 1909, of the Tomato Ketchup sold in this Commonwealth. In view of the wide public interest in the subject, I recommend that it be published as a Bulletin of this Bureau.

I have the honor to remain,

Very respectfully,

JAMES FOUST,
Dairy and Food Commissioner.

TOMATO KETCHUP.

BY CHARLES H. LAWALL AND LEROY FORMAN.

The word "ketchup," spelled also "catchup" and catsup," is of oriental origin, being found in the Malay language as *Kechap* or *Kejap,* applied to a sauce eaten with meat or fish and in the Chinese language as *Koe-chiap,* applied to the brine or liquor of pickled fish. The spelling, "ketchup," according to one of the Government Bulletins (Bulletin 119, Bureau of Chemistry, U. S. Dept. of Agriculture, Experiments on the Spoilage of Tomato Ketchup) is the form which should be given preference, as the spelling, "catchup," which is accorded the preference in some of the leading American dictionaries, seems to be based upon the erroneous idea that the syllable "ketch" is a colloquial form of "catch." There is no etymological warrant for the much used form "catsup."

Ketchup is a generic term applied to sauces made from mushrooms, walnuts or tomatoes, the last being the material most extensively used in the United States. The tomato is the fruit of a plant native to tropical South America, the Spanish name *Tomate* being undoubtedly derived by the early explorers from the Mexican word *Tomatl.*

It is an interesting fact, well known to older persons still living, that this important fruit or vegetable, for it plays the part of both in our culinary affairs, was long believed to be unfit for food and was cultivated as an ornamental plant in the United States until some time just prior to 1840, when it came into use gradually at first and then by leaps and bounds, so that at the present time it is one of the most popular vegetables supplied in the canned form, more than thirteen million dozen cans having been packed in one year (1910), this being exclusive of its use in soups, sauces, relishes and ketchup, or in the fresh condition in salads, etc. It is also of interest to note that the name "love apple," by which the fruit and the plant were formerly often known, came really from the Italian name *Pomo de Mori* or apple of Morocco, where it was early cultivated, corrupted by the French into *pomme d'amour,* whence our translation into love apple.

The composition of the tomato varies slightly, due to size, commercial variety and climatic conditions, and is approximately as follows:

Composition of the whole, unpeeled tomatoes:

Water,	from	91.30%	to	96.30%
Fat,	from	0.05%	to	0.25%
Protein,	from	0.30%	to	1.30%
Sugars,	from	2.20%	to	6.50%
Crude fibre,	from	0.50%	to	1.20%
Ash,	from	0.30%	to	0.80%
Acid (mainly citric)	from	0.25%	to	0.75%

Coloring matter resembling carrotin, undetermined.

From these figures it will be seen that tomatoes are very low in nutritive value, containing only from 75 to 160 calories per lb. av. (2,500 calories being the average daily adult requirement) and are properly to be considered as an adjunct food or as a relish.

The use of tomatoes as a basis for the popular condiment called ketchup seems to be peculiar to the United States where the fruit has also attained its greatest popularity in the cooked form as a vegetable and in the raw condition as the basis of salads.

Tomato ketchup is one of the most widely used of American condiments and has enjoyed this popularity for many years past. It is therefore a matter of surprise that no mention whatever is made in the latest edition of the Encyclopedia Britannica of this use of the tomato in the article on the tomato, and the nine line article on "ketchup" in that famous work, merely mentions it in a list of other ketchups, stating that it is made from the *juice* of the tomato.

The definition of ketchup, according to the Committee on Standards of the American Association of Official Agricultural Chemists, is as follows:

"Ketchup is the clean, sound product made from the properly prepared pulp of clean, sound, fresh, ripe tomatoes, with spices and with or without sugar and vinegar."

Many investigations have been made of the tomato ketchups of commerce, both before and since the passage of the United States Food and Drugs Act of June 30, 1906. The most comprehensive and satisfactory investigations of this kind have been made by the Connecticut Agricultural Experiment Station and published in the Annual Reports of that Bureau. These reports may be taken as typical of existing conditions for the periods named.

In 1897 the Connecticut authorities reported the examination of 41 different brands, of which only 6 contained no preservative whatever, 27 contained salicylic acid and 8 contained benzoic acid (sodium benzoate). Practically all of the brands, which are now well known and widely advertised, were at that time being preserved with either

salicylic acid or benzoic acid and the majority were using the former, which is now prohibited by practically all food laws. No report was made of the coloring matter in these samples.

In 1901 the Connecticut authorities again reported the examination of a large number of brands of tomato ketchup. Out of 94 different brands examined only 10 were found to be free from chemical preservatives and coal tar color, 8 contained coal tar color but no preservative, while of the 76 preserved samples, 61 contained benzoic acid while 15 contained salicylic acid. These figures show that the manufacturers were voluntarily changing from the more harmful salicylic acid to the less harmful benzoic acid, for there was no national legislation on the subject and State laws were few and but indifferently enforced. Among those who had changed from salicylic acid to benzoic acid were most of the well known brands of to-day, but practically all of these were using coal tar color to give the bright red appearance thought necessary to catch the eye of the consuming public.

In 1904, just two years prior to the passage of the National Act, another investigation was made by the Connecticut Station, with the result that out of 66 brands of tomato catsup, not one sample was found to be free from both preservatives and artificial coloring matter. Of the 66 brands, 61 contained benzoic acid, 1 contained sali cylic acid and 58 contained artificial color.

By this time it will be seen that salicylic acid had practically been abandoned by the manufacturers themselves, the brands having large interstate sales probably being stimulated in that direction by the enforcement of the law in Pennsylvania and some other states against the use of salicylic acid. Practically all, however, were using artificial color.

In 1910, or four years after the Federal Food and Drugs Act became effective, a still more comprehensive examination was made and published by the Connecticut authorities. By this time the use of salicylic acid had been entirely abandoned by the manufacturers. Of the 73 brands examined only 7 were free from benzoic acid and coloring matter. Of the remaining 66 samples, 48 were found to contain an excessive amount of the preservative, the amount being over double that claimed in 19 of the samples. Only 9 of the 73 brands were found to contain artificial color, showing that the pendulum was swinging away from the use of coloring matter, which, while not prohibited, was required to be declared upon the label. Five of the above samples were found to contain saccharin as the sweetening agent and these brands are reported to have been among the lowest grades examined.

These investigations, covering a period of 14 years, may be taken as typical of existing conditions up to a very recent time and will serve as an interesting basis for comparison with the figures given for the investigation of tomato ketchups in Pennsylvania in the summer of the present year, 1915. The facts stated and the summary given may be verified by reference to the Annual Reports of the Connecticut Agricultural Experiment Station for the years named.

Before taking up in detail the results of the investigations reported in this article, it will be necessary to refer to other factors which have arisen in the meantime through investigations, made principally by the Bureau of Chemistry of the U. S. Dept. of Agriculture, in which it will be found that the microscopic examination of ketchup is necessary in order to determine the past history of the product as regards soundness of the tomato pulp and freedom from decomposition prior to the manufacture of the ketchup.

Not all ketchup manufacturers are able to make their entire year's supply of tomato ketchup during the season when the fruit is ripening and being brought to market and many of them must depend upon the article known as tomato pulp, which is usually concentrated to a certain extent and sterilized or preserved for future use. Investigations at that time of market samples of some of the lower priced and less well known brands of ketchups showed that the conditions must have been very unsanitary or the pulp must have been very carelessly handled to account for the evidences of spoilage in the finished product, indicated by the presence of moulds in abundance and also of yeasts and spores and of dead bacteria.

In 1909, the Bureau of Chemistry published a bulletin entitled, "Bulletin 119, Bureau of Chemistry, U. S. Dept. of Agriculture: Experiments on the Spoilage of Tomato Ketchup, by Dr. A. W. Bitting." In this publication there is detailed the most comprehensive study of ketchup manufacture ever attempted, which was based upon a study of actual manufacturing conditions and included both chemical and bacteriological research.

Dr Bitting's work was supplemented in February, 1911, by another publication of the U. S. Dept. of Agriculture, i. e. "Circular No. 68, Bureau of Chemistry: Tomato Ketchup Under the Microscope, by Dr. B. J. Howard." In this circular was detailed the method of procedure for a microscopic examination which has for its object the determination of the soundness of the product and its freedom from marked evidences of decomposition. A set of tentative standards was also suggested, in which it was stated that not more than 25% of the fields examined under specified conditions, should show the presence of moulds, that the yeasts and spores should be below 25 per 1-60 cubic millimeter and that the number of dead and living bacteria should not exceed 25 million to each cubic centimeter.

Inasmuch as climatic conditions, as well as time of handling, are important factors in raising the number of bacteria, the figures for bacteria must be considered as nearly ideal. In one of the factory experiments detailed in this circular it is stated that the bacterial content of a batch of tomato juice has increased from 7 million per cubic centimeter to 84 million per cubic centimeter within five hours, which is less than a working day.

Another Government publication of interest in connection with tomato ketchup is Circular No. 78, of the Bureau of Chemistry, U. S. Dept. of Agriculture, October 16, 1911, on changes taking place during the spoilage in tomato products by Raymond F. Bacon and P. B. Dunbar. In this circular the problem is attacked from the chemical standpoint and a ratio of citric acid to lactic acid was taken as the basis of determination of the degree of spoilage.

An interesting contribution on a related subject from a non-governmental authority was published in August, 1914, by Dr. W. D. Bigelow and Dr. F. F. Fitzgerald, as Bulletin No. 3, of the Research Laboratory of the National Canners' Association. In this article the subject of tomato pulp, the crude material used by both the soup and ketchup manufacturers, is studied and recommendations embodying many practical points are made.

In the meantime the Bureau of Chemistry Officials of the U. S. Dept. of Agriculture were bringing prosecutions for tomato ketchup sold in interstate commerce in which violation of the law was charged in a number of different ways. Most of the earlier prosecutions, that is prior to 1911, were based upon misbranding charges for excess of preservative, presence of undeclared glucose, etc. About 1910 and from that time up to the present, many cases have been brought under the national law and convictions sustained for a product which is alleged to be "filthy, decomposed and putrid," to quote the words of the section of the act under which these cases were brought. In 1910, such prosecutions as were instituted under this charge, gave no detailed information as to the methods by which such spoilage had been detected, but beginning with 1911, we find that the results of Dr. Bitting's work in 1909 and Dr. Howard's work in February, 1911, are shown in the fact that figures of the moulds, bacteria and yeasts and spores accompany most of the charges of decomposition.

A review of the 30 cases described in the Notices of Judgment from 1 to 3,000, in which figures for these essential factors accompany the charges shows the following results:

In 30 Cases.	Per cent. of fields showing moulds.	No. of yeasts and spores to each 1/60 Cc.	Millions of bacteria to each Cc.
Maximum,	95	350	480
Minimum,	35	37	21
Average,	67	118	143

It will be seen that high yeasts and spores and high moulds form the real basis for successful prosecutions. In the instance where but 21 million bacteria were found (this being well within the limits for a clean, high grade product) there were found 62 yeasts and spores to each 1-60 Cc. and moulds in 90 per cent. of the fields examined.

In April and May, 1915, by order of the Pennsylvania Dairy and Food Commissioner, James Foust, there were collected in the State of Pennsylvania 142 samples of tomato ketchup, representing 135 different brands. Of these, 91 samples were collected by Special Agent, H. L. Banzhoff, of Altoona, Pa., in cities and towns outside of Philadelphia, 25 samples were collected in Philadelphia by Special Agent, Robert M. Simmers, of Phoenixville, Pa., and 26 samples were collected in Philadelphia by Special Agent, W. E. Supplee, of Philadelphia.

In view of the inconclusive value of some of the results obtained by the complete analyses of the Connecticut Agricultural Experiment Station, it was decided to estimate the total solids, which would give a basis for comparison of the ketchups from the standpoint of actual values expressed in the form of dry material; the total soluble solids, which would give some idea as to the cellular tissue contributed by the pulp, spices, etc.; the volatile acids expressed as acetic acid, in order to study this factor in connection with the question of the presence or absence of preservatives; the character of the color, whether natural or artificial; a search for saccharin and preservatives and their estimation when found and a tabulation of the results of the microscopic examination conducted according to the directions outlined in Dr. Howard's circular, to which reference was previously made. All of the chemical determinations and tests were made by the standard methods of the American Association of Official Agricultural Chemists, as given in Bulletin No. 107, of the U. S. Dept. of Agriculture.

The following is the list of brands examined, together with the agent's sample number, chemist's analytical number and a statement of the essential facts appearing upon the label. The quantities as stated were all found to be within the limits of tolerance for the amounts stated except in one instance when a half pint bottle bore a label undoubtedly intended for one double the size, which was a manifest error and was ignored.

S. M. R. 11493. C. H. L. 11805. Melrose Catsup. Packed for Githens, Rexsamer & Co., Phila., Pa. Made from tomatoes, spices, vinegar and sugar. Free from artificial coloring. Contents, 11 oz. av. Price, 12 cents.

S. M. R. 11494. C. H. L. 11806. L. & S. Tomato Catsup. Lutz & Schramm Co., Pittsburgh, Pa. The only catsup that has a real tomato flavor. Made from fresh, ripe tomatoes, spices, granulated cane sugar, pure vinegar, onions and salt. Contents, 7½ oz. av. net wt. Price, 12 cents.

S. M. R. 11495. C. H. L. 11807. Mother Cook Brand Tomato Catsup. Colonial Conserve Co., Phila., Pa. Prepared from fresh, ripe tomatoes, sugar, vinegar, onions, salt and spices. Contains 1-10% benzoate of soda. Contents, 10 oz. av. wt. Price, 10 cents.

S. M. R. 11496. C. H. L. 11808. Mother Sharp's Brand Tomato Catsup. S. W. Haney Preserving Co., Phila. Contains 1-10% benzoate of soda. Contents, 5 oz. Price, 7 cents.

S. M. R. 11497. C. H. L. 11809. Ritter's Whole Tomato Catsup with Tabasco. Guaranteed by P. J. Ritter Conserve Co., Phila. Pa. Contains no bezoate of soda or artificial color. Made from whole, ripe tomatoes, spices, vinegar, onions, garlic, salt and sugar. Contents, 8½ oz. av. net wt. Price, 10 cents.

S. M. R. 11498. C. H. L. 11810. Mrs. Williams' Brand Tomato Catsup. Quaker City Pure Fruit & Sugar Preserve Co., Phila., Pa. 1-10 of 1% benzoate of soda. Contents, 9 oz. Price, 10 cents.

S. M. R. 11499. C. H. L. 11811. Snider's Tomato Catsup. Guaranteed by the T. A. Snider Preserve Co., under the Food and Drugs Act. Contains tomatoes, granulated sugar, salt, vinegar, onions, garlic and spices. Contents over 8 oz. av. Price, 15 cents.

S. M. R. 11500. C. H. L. 11812. Apollo Tomato Ketchup. Packed for Halpen, Green & Co., Phila., Pa. This ketchup is made from tomatoes, spices, vinegar and sugar. Free from coloring. Contents, 11 oz. av. Price, 10 cents.

S. M. R. 11501. C. H. L. 11813. Argood Brand Tomato Ketchup. Packed for Fred P. Bell, W. Phila., Pa. Net weight not less than 10½ oz. Price, 15 cents.

S. M. R. 11502. C. H. L. 11814. Monmouth Brand Tomato Kechup. Put up by Crine Packing & Seed Co., Morganville, N. J. Made from whole, red, ripe tomatoes only. Seasoned with pure spices and contains no artificial color. Net wt., 15½ oz. Price, 12 cents.

S. M. R. 11503. C. H. L. 11815. Schramm's Whole Tomato Catsup. 1-10% benzoate of soda. Net contents, 4 oz. Price, 5 cents. Phila.

S. M. R. 11504. C. H. L. 11816. Harbauer's Tomato Catsup. Made by the Harbauer Co., Toledo, O. Made from tomatoes, granulated sugar, onions, spices and vinegar. Guaranteed free from artificial color. Preserved with 1-10% benzoate of soda. Contents, 6 oz. av. Price, 5 cents.

S. M. R. 11505. C. H. L. 11817. Quaker City Preserve Co.'s Tomato Ketchup. Sodium benzoate. Contents, 6 oz. Price, 5 cents.

S. M. R. 11506. C. H. L. 11818. William Penn Tomato Catsup. Wm. Lauteryung, 234-6 Vine St., Phila., Pa. Contains enough benzoate of soda to prevent mold. Contents, 4 oz. Price, 5 cents.

S. M. R. 11507. C. H. L. 11819. Old Virginia Tomato Catsup. McMechen Preserving Co., Wheeling, W. Va. Made from selected ripe tomatoes, granulated sugar, salt, pure spices, grain vinegar. Preserved with 1-10 of 1% benzoate of soda. Contents, 6 oz. Price, 5 cents.

W. E. S. 977. C. H. L. 11821. Stohrer's Tomato Catsup. Keystone Pickle Works, Phila. Contents, 9 fl. oz. Price, 9 cents.

W. E. S. 978. C. H. L. 11822. Bonny Best Tomato Catsup. Crine Packing and Seed Co., Morganville, N. J. Made from whole, red, ripe tomatoes, distilled vinegar, salt, granulated sugar and purest spices. Contains no artificial color. Contents, 7½ oz. Price, 5 cents.

W. E. S. 979. C. H. L. 11823. Rio Grande Tomato Catsup. Keystone Pickle Works, Phila. Stohrer's. Contents, 9 fl. oz. Price, 10 cents.

W. E. S. 980. C. H. L. 11824. Blue Label Tomato Ketchup. Curtice Bros. Co., Rochester, N. Y. Made by thoroughly domestic methods from red, ripe tomatoes, pure spices, salt, sugar and vinegar. Guaranteed free from artificial color. Contains 1-10% benzoate of soda. Contents, 8 oz. Price, 10 cents.

W. E. S. 981. C. H. L. 11825. Our Pet Tomato Catsup. The Harbauer Co., Toledo, O. Made from tomatoes, granulated sugar, onions, spices and vinegar. Guaranteed free from artificial color. Contents, 6 oz. av. Price, 5 cents.

W. E. S. 982. C. H. L. 11826. Eureka Brand Tomato Ketchup. John Maier, distributor, Phila. 1-10 benzoate of soda. Contents, 5 oz. av. Price, 5 cents.

W. E. S. 983. C. H. L. 11829. Garden Brand Tomato Ketchup. Packed for John Price & Co., Phila. Made from tomatoes, pure spices, vinegar and sugar. Free from artificial color and preservatives. Contents, 11 oz. Price, 10 cents.

W. E. S. 984. C. H. L. 11828. Mountain City Catsup. Lippincott & Co., Phila. and Altoona, Pa. Made from tomatoes, granulated sugar, onions, spices and vinegar. No chemical preservatives used. Contents, 10¼ oz. Price, 10 cents.

W. E. S. 985. C. H. L. 11829. Table Talk Tomato Ketchup. Manufactured by R. C. Chance's Sons, Phila. Made from tomatoes, pure spices, vinegar, sugar. Free from coloring and preservatives. Contents, 11 oz. av. Price, 10 cents.

W. E. S. 986. C. H. L. 11830. Crown of Quality Tomato Catsup. Pincus & Crown, Chester, Pa. Made of whole tomatoes, sugar, salt, vinegar, onions and pure spices. 1-10% benzoate of soda. Contents, 4 fl. oz. Price, 5 cents.

W. E. S. 987. C. H. L. 11831. Adelphia Brand Catsup. Adelphia Products Co., distributors, Phila. Made from tomatoes, granulated sugar, onions, spices and vinegar. 1-10% benzoate of soda. Contents, 5 oz. Price, 5 cents.

W. E. S. 988. C. H. L. 11832. Mrs. Dolby's Tomato Catsup. Distributed by The Home Preserving & Pickling Co., 1635 S. Marshall St., Phila. Prepared with 1-10% benzoate of soda to prevent fermentation. Contents, 16 oz. Price, 10 cents.

W. E. S. 989. C. H. L. 11833. Excelsior Tomato Catsup. Wm. Lauteryung, 234-6 Vine St., Phila. Prepared with 1-10% benzoate of soda. Made from fresh, ripe tomatoes. Contents, 10 oz. Price, 10 cents.

W. E. S. 990. C. H. L. 11834. Wilca Brand Catsup. Carl Wilde, Importer, Phila. Made from tomatoes, granulated sugar, onions, spices and vinegar. No chemical preservatives used. Contents, $10\frac{1}{2}$ oz. Price, 10 cents.

W. E. S. 991. C. H. L. 11835. Mendelion Brand Catsup. Distributors, M. Eiseman & Sons, Phila. Absolutely pure and free from artificial color. Contents, $8\frac{1}{2}$ oz. Price, 10 cents.

W. E. S. 993. C. H. L. 11837. Morris Best Tomato Catsup. Lansdale Pure Food Co., Lansdale and Perkasie, Pa., 1227 Germantown Ave., Phila. Contains small tomatoes, trimmings, onions, garlic, spice, sugar. 1-10 benzoate of soda. Contents, $5\frac{1}{2}$ oz. net. Price, 5 cents.

W. E. S. 994. C. H. L. 11838. Sunrise Ketchup. Packed by Phila. Pickling Co. Made from ripe tomatoes, granulated sugar, salt, vinegar, onions, garlic, and pure spices. Contents, 8 oz. Price 10 cents.

W. E. S. 1008. C. H. L. 11872. True Blue Tomato Catsup. Wm. C. Young, Phila. Made from tomatoes, granulated sugar, onions, spices and vinegar. No chemical preservatives used. Contents, $10\frac{1}{2}$ oz., net wt. Price, 10 cents.

W. E. S. 1009. C. H. L. 11873. Campbell's Tabasco Ketchup. Joseph Campbell & Co., Camden, N. J. Pasteurized. Net wt., $17\frac{1}{2}$ oz. Price, 8 cents. (error in labeling, contents was 9 oz.)

W. E. S. 1010. C. H. L. 11874. Rex Tomato Ketchup. The Cudahy Packing Co. Made from fresh, ripe, whole tomatoes (from which the skins, cores and seeds have been removed), granulated sugar, salt, distilled vinegar, spices and onions. Net wt., 8 oz. Price, 12 cents.

W. E. S. 1011. C. H. L. 11875. J. H. Boeckle's Ketchup. Star Pickling Works, Phila. J. H. Boeckle. This condiment is prepared from selected ripe tomatoes, flavored with distilled vinegar, sugar and choice spices. Preserved with 1-10% benzoate of soda. Contents, 4½ fl. oz. Price, 5 cents.

W. E. S. 1012. C. H. L. 11876. Crescent Tomato Ketchup. Guaranteed absolutely pure. Made from and contains only whole, red ripe tomatoes, pure spices, distilled vinegar, granulated sugar, salt, onions and garlic. Net wt., 8 oz. Price, 7 cents.

W. E. S. 1013. C. H. L. 11877. Unity Brand Tomato Ketchup. Frankford Grocery Co., Frankford, Pa. Net weight, 10½ oz. Price, 10 cents.

W. E. S. 1014. C. H. L. 11828. Van Camp's Tomato Catsup. Van Camp Packing Co., Indianapolis, Indiana. Ingredients: Tomatoes, sugar, vinegar, salt, cloves, allspice, cayenne pepper, onions and 1-10 benzoate of soda. Net wt. about 16 oz. Price, 20 cents.

W. E. S. 1015. C. H. L. 11879. Beech Nut Tomato Catsup. Beech Nut Packing Co., Rochester, N. Y. Made from whole, red, ripe tomatoes, vinegar, sugar, spices, salt and onions. Contents, 7¼ oz. Price, 15 cents.

W. E. S. 1016. C. H. L. 11880. Brandywine Hills Tomato Catsup. Packed for B. S. Janney, Jr. & Co., Phila. This ketchup is made from tomatoes, pure spices, vinegar and sugar. Free from all artificial coloring and preserved with 1-10% benzoate of soda. No wt. marked. 10 oz. Price, 12 cents.

S. M. R. 11526. C. H. L. 11884. Park Farm Tomato Catsup. Mitchell, Fletcher & Co., Phila. Composed of fresh, ripe tomatoes, granulated sugar, salt, distilled vinegar, garlic, onions and pure spices. Net wt., 8 oz. Price, 15 cents.

S. M. R. 11527. C. H. L. 11885. Heinz' Tomato Ketchup. H. J. Heinz Co., Pittsburgh, Pa. Made from fresh, ripe tomatoes, spices, granulated cane sugar, pure vinegar, onions and salt. Free from benzoate of soda or other drugs, artificial preservatives and coloring matter. Net wt., 8¼ oz. Price, 15 cents.

S. M. R. 11528. C. H. L. 11886. Libby's Tomato Catsup. Libby, McNeill & Libby, Chicago, Ill. Natural color and flavor. Free from preservative. Net wt., 10 oz. Price, 15 cents.

S. M. R. 11529. C. H. L. 11887. Sunbeam Tomato Catsup. Austin Nicholls & Co., distributors, N. Y. Prepared from ripe tomatoes, salt, granulated cane sugar, vinegar, onions, garlic and spices. Contents, 16 fl. oz. Price, 25 cents.

S. M. R. 11530. C. H. L. 11888. Our Choice Tomato Catsup. Put up by Wm. King & Co., Phila., from whole, sound, ripe tomatoes, sugar, salt, spices and vinegar. Net wt., 11¾ oz. Price, 12 cents.

S. M. R. 11531. C. H. L. 11889. Bonny Best Tomato Catsup. Crine Packing & Seed Co., Morganville, N. J. Made from whole, red, ripe tomatoes, distilled vinegar, salt, granulated sugar, and purest spices. Contains no artificial color. Net wt., 7½ oz. Price, 5 cents.

S. M. R. 11532. C. H. L. 11890. Duchess Brand Tomato Ketchup. Distributed by Alfred Lowry & Bro., Phila. No declaration of preservative or wt. 7½ oz. Price, 10 cents.

S. M. R. 11533. C. H. L. 11891. Rio Grande Brand Tomato Catsup. Stohrer's Keystone Pickle Works. Contains no added preservative. Contents, 9 fl. oz. Price, 10 cents.

S. M. R. 11534. C. H. L. 11892. Monmouth Brand Tomato Ketchup. Put up by Crine Packing & Seed Co., Morganville, N. J. Made from whole, red, ripe tomatoes only. Seasoned with pure spices and contains no artificial color. Contents, 15½ oz. av. Price, 9 cents.

S. M. R. 11542. C. H. L. 11900. Old Homestead Tomato Catsup. Home Pickling Co., 1535 S. Marshall St., Phila. Made from tomatoes, granulated sugar, onions, spices and vinegar. Prepared with benzoate of soda to prevent fermentation. Net wt., 6 oz. Price, 5 cents.

H. L. B. 5953. C. H. L. 11929. A. & P. Tomato Ketchup. Great A. & P. Tea Co., distributors, Jersey City, N. J. Composed of fresh, ripe tomatoes, granulated sugar, spices, onions, garlic, salt and distilled vinegar. Not artificially colored. Contains no preservative. Net wt., 16 oz. Price, 18 cents.

H. L. B. 5954. C. H. L. 11930. White Horse Tomato Catsup. Reid, Murdoch Co., Chicago. Guaranteed free from artificial color. Net wt., 18 oz. Price, 18 cents.

H. L. B. 5955. C. H. L. 11931. Bordeaux Brand Tomato Catsup. The Van Camp Packing Co., Indianapolis, Ind. Made from tomatoes, spices, sugar and vinegar. Net contents, 15 oz. av. Price, 15 cents.

H. L. B. 5956. C. H. L. 11932. Heinz Tomato Ketchup. H. J. Heinz Co., Pittsburgh, Pa. Made from fresh, ripe tomatoes, spices, granulated cane sugar, pure vinegar, onions, salt. Free from benzoate of soda, other drugs or artificial preservatives. Net wt., 8½ oz. av. Price, 15 cents.

H. L. B. 5957. C. H. L. 11933. Beech Nut Brand Tomato Catsup. Beech Nut Packing Co., Rochester, N. Y. Made from whole, red, ripe tomatoes, vinegar, sugar, spices, salt and onions. Contents, ½ pint, Price, 15 cents.

H. L. B. 5958. C. H. L. 11934. Burt Olney's Ketchup. The Burt Olney Canning Co., Oneida, N. Y. Made from fresh, whole, ripe tomatoes, seasoned with pure whole spices, pure grain vinegar, salt, onions and granulated sugar. Free from benzoate of soda and coloring matter. Contents, 8 oz. Price, 10 cents.

H. L. B. 5959. C. H. L. 11935. Crubro Tomato Ketchup. Cruikshank Bros. & Co., Pittsburgh, Pa. Not artificially preserved or colored, only clean and pure materials used. Contents, 7 fl. oz. Price, 5 cents.

H. L. B. 5960. C. H. L. 11936. Mother's Kind Tomato Catsup. Grantham Preserving & Pickling Co., Grantham, Pa. Strictly pure. Net wt., 8 oz. Price, 10 cents.

H. L. B. 5961. C. H. L. 11937. Golden Tree Tomato Ketchup. New England Maple Syrup Co., Boston. Made from whole, red, ripe tomatoes only. Seasoned with pure spices and contains no artificial color. Net wt., 7½ oz. av. Price, 11 cents.

H. L. B. 5962. C. H. L. 11938. Williams' Tomato Catsup. The Williams Bros., Detroit, Mich. Made from tomatoes, sugar, salt, vinegar and spices. Net wt., 11¾ oz. Price, 10 cents.

H. L. B. 5963. C. H. L. 11939. Naboth Tomato Catsup. Naboth Vineyards, Brocton, N. Y. Made from ripe tomatoes, spices, vinegar, salt, sugar and onions. Contents, 4 oz. Price, 5 cents.

H. L. B. 5964. C. H. L. 11940. Wagner's Catsup. Prepared by Martin Wagner Co., Baltimore, Md. Made from fresh, ripe tomatoes, spices, granulated sugar, garlic, vinegar, salt and onions. Contents, 8 oz. av. Price, 10 cents.

H. L. B. 5965. C. H. L. 11941. Wingold Catsup. Packed for Dilworth Bros. Co., Pittsburgh. Guaranteed to be made from ripe tomatoes, sugar, spice and vinegar. No chemical preservatives used. Contents, 8 oz. av. Price, 10 cents.

H. L. B. 5966. C. H. L. 11942. Libby's Catchup (pure tomato). Packed and guaranteed by Libby, McNeil & Libby, Chicago. Natural flavor and color. Free from preservative. Contents, 8¼ fl. oz. Price, 15 cents.

H. L. B. 4967. C. H. L. 11943. Community Ketchup. No declaration of constituents or preservatives. Net wt., 8 oz. Price, 10 cents.

H. L. B. 5968. C. H. L. 11944. Bull Head Tomato Catsup. Gibbs Preserving Co., Baltimore, Md. No declaration of constituents or preservatives. Net wt., 8 oz. Price, 10 cents.

H. L. B. 5969. C. H. L. 11945. Waldorf Tomato Catsup. The Williams Bros. Co., Detroit, Mich. Made from whole, ripe tomatoes, sugar, salt, distilled vinegar and spices. Net wt., 11¾ oz. Price, 10 cents.

H. L. B. 5970. C. H. L. 11946. Rosedale Ketchup. Schwenk & Caldwell, Phila. No declaration of constituents or preservatives Net wt., not less than 10½ oz. Price, 10 cents.

H. L. B. 5971. C. H. L. 11947. Fort Cumberland Catsup. J. G. Orrick & Son, Cumberland, Md. Prepared from the purest varieties of selected ripe tomatoes. Contents, 10 oz. Price, 10 cents.

H. L. B. 5972. C. H. L. 11948. Prestige Brand Tomato Catsup. For Westmoreland Grocery Co., Greenburg, Pa. Highest quality. Made from tomatoes, granulated sugar, onions, spices and vinegar. Guaranteed free from artificial color. No chemical preservatives used. Net wt., 11½ oz. Price, 10 cents.

H. L. B. 5973. C. H. L. 11949. Parker House Catsup. McMechen Preserving Co., Wheeling, W. Va. Prepared under strictly sanitary conditions. Contains no chemical preservatives. Net wt., 9 oz. av. Price, 10 cents.

H. L. B. 5974. C. H. L. 11950. Butterfly Tomato Catsup. Packed for Arbuckle and Co., Pittsburgh. Strictly pure. No declaration of constituents or preservatives. Contents, 11½ oz. Price, 10 cents.

H. L. B. 5975. C. H. L. 11951. Hoffman House Tomato Catsup. J. Weller Co., Oak Harbor, Ohio. No declaration of constituents or preservatives. Contents, 11 oz. av. Price, 10 cents.

H. L. B. 5976. C. H. L. 11952. Robin Hood Tomato Catsup. R. C. Williams & Co., distributors, N. Y. Prepared from tomatoes, spices, sugar, onions, salt and vinegar. Natural color. Net wt., 10½ oz. Price, 10 cents.

H. L. B. 5977. C. H. L. 11953. Fayette Brand Tomato Ketchup. Uniontown Grocery Co. Made from tomatoes, spices, vinegar and sugar. Free from coloring. Contents of benzoate of soda stricken off. Contents, 11 oz. av. Price, 10 cents.

H. L. B. 5978. C. H. L. 11954. Knighthood Tomato Catsup. Reese and Co., Phila. Made from tomatoes, granulated sugar, onions, spices and vinegar. Guaranteed free from artificial color, av. net wt., 10 oz. Price, 10 cents.

H. L. B. 5979. C. H. L. 11955. A B C Tomato Catsup. Lee Chataway Jacob & Co., Carnegie, Pa. No declaration of constituents or preservatives. "Quality first." Av. wt., 10 oz. Price, 10 cents.

H. L. B. 5980. C. H. L. 11956. Monarch Tomato Catsup. Reid, Murdock & Co., Chicago. Made from fresh, ripe tomatoes, uncolored. "We guarantee Monarch Catsup to be made from fresh, ripe tomatoes; it contains no artificial color and is made by a new process, absolutely our own, coming in contact, while cooking, with no other metal than silver, thus retaining to the fullest extent the natural color and flavor of the tomato." Net wt., 16 oz. Price, 25 cents.

H. L. B. 5981. C. H. L. 11957. Astoria Tomato Catsup. S. B. Vanfill Co., Baltimore, Md. No declaration of preservatives or constituents. Net wt., 9½ fl. oz. Price, 10 cents.

H. L. B. 5982. C. H. L. 11958. Our Judge Tomato Catsup. Johnson, Earl, Myers Co., Pittsburgh, Pa. Free from any artificial coloring. Preserved with 1-10 of 1% sodium benzoate. Contents, 10 oz. Price, 10 cents.

H. L. B. 5983. C. H. L. 11959. Winorr Tomato Catsup. The Pressing & Orr Co., Norwalk, Ohio. Made from fresh, ripe tomatoes, vinegar, sugar, salt and pure spices. To prevent fermentation, 1-10 of 1% benzoate of soda is added. Contents, 15½ oz. Price, 10 cents.

H. L. B. 5984. C. H. L. 11960. Iron King Catsup. Vosbank Bros. Co., distributors, Pittsburgh. Preserved with 1-10 of 1% benzoate of soda. Contents, 10 oz. or over. Price, 10 cents.

H. L. B. 5985. C. H. L. 11961. Tube City Tomato Catsup. Packed for Potter McCune Co., McKeesport, Pa. Preserved with 1-10 of 1% benzoate of soda. No declaration of constituents. Contents, 10 oz. Price, 10 cents.

H. L. B. 5986. C. H. L. 11962. Tweed's Tomato Ketchup. Tweed & Botsford, Pittsburgh, Pa. Guaranteed to be made from ripe to-

matoes, sugar, spices, vinegar and onions. No benzoate of soda or other artificial preservative used. Av. net wt., 9 oz. Price, 10 cents.

H. L. B. 5987. C. H. L. 11963. Mars' Tomato Katsup. A. L. Mars & Co., Pittsburgh, Pa. Made from tomatoes, granulated sugar, onions, spices and vinegar. No chemical preservatives used. Guaranteed free from artificial color. Av. net wt., 11½ oz. Price, 10 cents.

H. L. B. 5988. C. H. L. 11964. Luzerne Tomato Ketchup. The Garrahan Canning Co., Luzerne, Pa. Guaranteed and packed by the Garrahan Canning Co. Contains tomatoes, granulated sugar, salt, vinegar, onions, garlic and spices. Net wt., 14 oz. Price, 10 cents.

H. L. B. 5989. C. H. L. 11965. White House Tomato Catsup. Thos. C. Jenkins, Pittsburgh, Pa. Made from tomatoes, granulated sugar, onions, vinegar and spices. Free from artificial color. No chemical preservative used. Av. net wt., 10½ oz. Price, 10 cents.

H. L. B. 5990. C. H. L. 11966. Bonny Best Tomato Catsup. Crine Packing Co., Morganville, N. J. Made from whole, red, ripe tomatoes, distilled vinegar, salt, granulated sugar and purest spices. Contains no artificial color. Prepared with 1-10 of 1% benzoate of soda. Net wt., 15½ oz. Price, 10 cents.

H. L. B. 5991. C. H. L. 11967. Alice Brand Tomato Catsup. Dyer Packing Co., Vincennes, Ind. Made from ripe tomatoes, sugar, vinegar, salt and pure spices. Contains no chemical preservatives. Net wt., 11 oz. Price, 10 cents.

H. L. B. 5992. C. H. L. 11968. Satisfaction Brand Tomato Catsup. Haworth & Dewhurst, Limited, Pittsburgh, Pa. This catsup does not contain a chemical preservative. This catsup is free from artificial coloring. Wt., 11 oz. av. Price, 10 cents.

H. L. B. 5993. C. H. L. 11969. Lehman's High Grade Tomato Ketchup. A. G. Lehman Co., Pittsburgh, Pa. Guaranteed under Pure Food and Drugs Act, Serial No. 23370. Weight, 10 oz. Price, 20 cents.

H. L. B. 5994. C. H. L. 11970. Royal Blue Pure Tomato Catsup. Baer Grocery Co., Wheeling, W. Va., distributors. Made from whole tomatoes, granulated sugar, pure spices and vinegar. No chemical preservative or artificial coloring used. Net wt., 11½ oz. Price, 10 cents.

H. L. B. 5995. C. H. L. 11971. Gold Seal Tomato Ketchup. Alart & McGuire Co., New York. Net wt., not less than 10½ oz. Price, 10 cents.

H. L. B. 5996. C. H. L. 11972. Ladies' Favorite Tomato Catsup. Packed for Heller & Perrin, 67-69, Chatham St., Pittsburgh, Pa. Guaranteed absolutely free from chemicals and artificial coloring. Weight; 10 oz. Price, 10 cents.

H. L. B. 5997. C. H. L. 11973. Nemisella Brand Tomato Catsup (High grade). Canton Canning Co., Canton, Ohio. Prepared from whole tomatoes, pure spices, granulated cane sugar, vinegar, salt, onions and garlic. Preserved with 1-10 of 1% sodium benzoate. Av. net wt., 8 oz. Price, 9 cents.

H. L. B. 5998. C. H. L. 11974. Grant's Brand Tomato Catsup. Prepared and guaranteed by the Indiana Tomato Seed Co., Nabb., Ind. Contains granulated sugar, salt, vinegar, onions, garlic, spices and 1-10 of 1% benzoate of soda. Contents, over 12 fl. oz. Price, 10 cents.

H. L. B. 5999. C. H. L. 11975. Hirsch's Goodies Ketchup for Oyster Cocktail. Hirsch Bros. Co., Louisville, Ky. "The purest in the world." Av. net wt., 7½ oz. Price, 10 cents.

H. L. B. 6000. C. H. L. 11976. Old Virginia Ketchup. McMechen Preserving Co., Wheeling, W. Va. Made from selected ripe tomatoes. Guaranteed under the Pure Food & Drugs Act. Not artificially colored. Net wt., 16 oz. Price, 15 cents.

H. L. B. 6001. C. H. L. 11977. Superb Brand Catsup. Packed for S. B. Charters' Grocery Co., Pittsburgh, Pa. 10 oz. Price, 15 cents.

H. L. B. 6002. C. H. L. 11978. Behr Brand Tomato Catsup. Packed for H. F. Behrhorst & Son, Pittsburgh, Pa. Made from tomatoes, granulated sugar, onions, spices and vinegar. Guaranteed free from artificial color. No chemical preservatives used. Contents, 11 oz. Price, 10 cents.

H. L. B. 6003. C. H. L. 11979. Mrs. Rodes' Home Made Tomato Catsup. A. Rode & Co., Pittsburgh, Pa. Guaranteed pure. Net wt., 10 oz Price, 10 cents.

H. L. B. 6004. C. H. L. 11980. Burro Brand Tomato Catsup. The Frazier Packing Co., Ellwood, Ind. Guaranteed under the Pure Food & Drugs Act. Net av. wt., 9 oz. Price, 10 cents.

H. L. B. 6005. C. H. L. 11981. Cochrane Tomato Catsup. Cochrane Bros., Pittsburgh, Pa. Made from ripe tomatoes, pure spices, vinegar and granulated sugar. Contains no artificial color or preservative. Contents, 10 oz. av. Price, 10 cents.

H. L. B. 6006. C. H. L. 11982. Marleau's Tomato Catsup. Marleau Packing Co., Toledo, O. Made from tomatoes, granulated sugar, onions, spices, and vinegar. Free from artificial color. No chemical preservative used. Guaranteed under Pure Food & Drugs Act. Av. net wt., 11¼ oz. Price, 10 cents.

H. L. B. 6007. C. H. L. 11983. Ko-we-ba Tomato Catsup. Packed for Kolb, Wells, Bauer Co. Co., Indianapolis, Ind. Not artificially colored. Finest quality. Weight, 16 oz. Price, 25 cents.

H. L. B. 6008. C. H. L. 11984. Meco Tomato Catsup. Miller Eberhard Co., Cleveland, O. From choice, whole, ripe tomatoes, sugar, onions, vinegar, salt, cayenne pepper, allspice, cloves, cinnamon and mace. Guaranteed under Pure Food & Drugs Act. Serial No. 36139. 1-10 of 1% benzoate of soda. Contents, 10 oz. Price, 10 cents.

H. L. B. 6009. C. H. L. 11985. Willard Brand Tomato Catsup. J. W. Huston Co., Pittsburgh, Pa. Prepared from ripe tomatoes, distilled vinegar, salt, granulated sugar, selected spices. Guaranteed free of artificial color. Net wt., 10 oz. Price, 10 cents.

H. L. B. 6010. C. H. L. 11986. Rex Brand Tomato Catsup. A. G. Lehman Co., Pittsburgh, Pa. 1-10 of 1% benzoate of soda. Serial No. 23370A. Contents, 10 oz. Price, 10 cents.

H. L. B. 6011. C. H. L. 11987. Ribbon Brand Tomato Catsup. New Castle Grocery Co., New Castle, Pa. Made from red, ripe, tomatoes, whole spices, salt, sugar, and does not contain colors or preservatives. Contents, 8 oz. Price, 10 cents.

H. L. B. 6012. C. H. L. 11988. Menu Tomato Catsup. The Harbauer Co., Toledo, O. Made from tomatoes, granulated sugar, onions, spices and vinegar. No chemical preservatives used. Free from artificial color. Contents, 10 oz. Price, 10 cents.

H. L. B. 6013. C. H. L. 11989. Shawnee Tomato Catsup. The Garrahan Packing Co., Luzerne, Pa. Neither artificial preservative or coloring. Net wt., 10 oz. Price, 8 cents.

H. L. B. 6014. C. H. L. 11990. Magnolia Tomato Catsup. The Wm. Edwards Co., Cleveland, O. 1-10 of 1% benzoate of soda. Guaranteed under the Pure Food & Drugs Act. Contents, 10 oz. Price, 10 cents.

H. L. B. 6015. C. H. L. 11991. Red Rose Tomato Catsup. Packed for C. A. Kurtze, Erie, Pa. Made from tomatoes, vinegar, salt, sugar and spices. Contents, 10 oz. Price, 10 cents.

H. L. B. 6016. C. H. L. 11992. Haller's Blue Star Tomato Catsup. Packed for Jacob Haller, Erie, Pa. Made from sound, ripe tomatoes, vinegar, sugar, pure spices, etc. Contains no preservatives. Net wt., 11½ oz. Price, 10 cents.

H. L. B. 6017. C. H. L. 11993. Elite Pure Food Tomato Catsup. Clark Chapin & Bushnell, distributors, N. Y. Made from fresh, ripe tomatoes, granulated sugar, spices, onions, garlic, salt and distilled vinegar. Contains no preservative. Net wt., 16 oz. Price, 25 cents.

H. L. B. 6018. C. H. L. 11994. Edwards' Tomato Catsup. Wm. Edwards Co., Cleveland, O. Free from added color or artificial preservative. Price, 25 cents. Contents, 16 oz.

H. L. B. 6019. C. H. L. 11995. Grafton Johnson's Tomato Catsup. Whiteland, Ind. Whole ripe Indiana tomatoes, granulated sugar, salt, vinegar, onions and pure spices. Free from preservatives or artificial coloring. Net wt., 10 oz. Price, 10. cents.

H. L. B. 6020. C. H. L. 11996. Commodore Tomato Catsup. Packed for the Weideman Co., Cleveland, O. Natural color. 1-10 of 1% sodium benzoate. Natural color. Net wt., 15 oz. Price, 20 cents.

H. L. B. 6021. C. H. L. 11997. Best Value Tomato Catsup. Put up for the Weidman Co., Cleveland, O. Contents, 11½ oz. av. Price, 10 cents.

H. L. B. 6022. C. H. L. 11998. Dold Quality Tomato Catsup. Jacob Dold Packing Co., Wichita, Kans. This is pasteurized catsup,

made from selected ripe tomatoes, flavored with pure spices, onions, salt, granulated cane sugar and distilled vinegar. No artificial color or preservative. Net wt., 11 oz. av. Price, 10 cents.

H. L. B. 6023. C. H. L. 11999. Weideman Bros. Tomato Catsup. Packed for the Weideman Co., Cleveland, O. Natural color. No chemical preservative. Guaranteed under the Pure Food & Drugs Act. Serial No. 2300. Contents, 11½ oz. Price, 15 cents.

H. L. B. 6024. C. H. L. 12000. Yours Truly Tomato Catsup. Distributed by Yours Truly Co., Chicago, Ill. Absolutely pure. Composed of fresh, ripe, tomatoes, spices, salt, onions, granulated sugar and distilled vinegar. No artificial preservative in this catsup. Av. wt., 16½ oz. Price, 15 cents.

H. L. B. 6025. C. H. L. 12001. Old Inn Tomato Catsup. The Castleman, Blakemore Co., Louisville, Ky. Prepared under strictly sanitary conditions. Net contents, wt., 10 oz. Price, 10 cents.

H. L. B. 6026. C. H. L. 12002. Glendora Tomato Catsup. Packed for Smith & Horton, Ltd., Warren, Pa. From fresh, ripe tomatoes, distilled vinegar, granulated cane sugar, salt, onions, garlic and spices. No artificial coloring. No benzoate of soda. Contents, 10 oz. Price, 10 cents.

H. L. B. 6027. C. H. L. 12003. Veteran Brand Tomato Catsup. Brewster, Gordon & Co., Rochester, N. Y. From tomatoes, granulated sugar, onions, vinegar and spices. Free from artificial color. Contents, 10½ oz. Price, 10 cents.

H. L. B. 6028. C. H. L. 12004. Monogram Brand Tomato Ketchup. Packed for Smith, Perkins & Co., Rochester, N. Y. Made from red, ripe, tomatoes, pure spices and granulated sugar. Net wt., not less than 10 oz. Price, 10 cents.

H. L. B. 6029. C. H. L. 12005. Richelieu Brand Tomato Catsup. Distributed by Sprague, Warner & Co., Chicago, Ill. Tomatoes, granulated sugar, distilled vinegar, onions, spices, salt and garlic. Prepared without preservative. Contents, 1 lb. Price, 25 cents.

H. L. B. 6030. C. H. L. 12006. Sovereign Tomato Catsup. Union Pacific Tea Co., distributors, Washington & Laight Sts., N. Y. From whole, ripe tomatoes, sugar, salt, pure spices and distilled vinegar. No chemicals, preservatives or artificial color. Net wt., 11 oz. Price, 15 cents.

H. L. B. 6031. C. H. L. 12007. Blue Star Tomato Catsup. Packed for Granger & Co., Buffalo, N. Y. Made from tomatoes, vinegar, salt, sugar and spices. Contents, 10 oz. Price, 10 cents.

H. L. B. 6032. C. H. L. 12008. Oakdale Brand Tomato Ketchup. Packed for Samuel Howell, Phila. From tomatoes, pure spices, vinegar and sugar. Free from coloring and preservatives. Wt., 11 oz. Price, 10 cents.

H. L. B. 6033. C. H. L. 12009. Lion Brand Tomato Catsup. Austin Nichols & Co., distributors, N. Y. Tomotoes, spices, sugar,

salt, vinegar and garlic. 1-10 of 1% benzoate of soda. Guaranteed under the Pure Food & Drugs Act. Contents, 16 oz. Price, 18 cents.

H. L. B. 6034. C. H. L. 12010. Blue Grass Belle Catsup. The Castleman, Blakemore Co., Inc., Louisville, Ky. Prepared under sanitary conditions. Contents, 16 oz. Price, 25 cents.

H. L. B. 6035. C. H. L. Nabob Tomato Ketchup. Distributed by Francis H. Leggett & Co., N. Y. Made from tomatoes, pure spices, vinegar and sugar. Free from artificial color or preservative. Guaranteed under the Pure Food & Drugs Act. Contents, 9½ oz. Price, 10 cents.

H. L. B. 6036. C. H. L. 12015. Luxury Brand Tomato Catsup. Packed for Clark Bros., Scranton, Pa. Made from tomatoes, granulated sugar, salt, onions, pure spices, grain vinegar and contains no chemical preservatives. Contents, 8 oz. Price, 10 cents.

H. L. B. 6037. C. H. L. 12016. Holsum Brand Tomato Ketchup. Packed for Sauker & Williams Co., Scranton, Pa. Prepared from ripe tomatoes, distilled vinegar, salt, granulated sugar, selected spices and guaranteed free from artificial coloring matter. Net wt., 10 oz. Price, 10 cents.

H. L. B. 6038. C. H. L. 12017. Booth's Pure Tomato Catsup. The Booth Packing Co., Baltimore, Md. Made from whole, ripe tomatoes, spices, granulated sugar, vinegar, onions, garlic and salt. Finest quality catsup. Net wt., 10 oz. Price, 10 cents.

H. L. B. 6039. C. H. L. 12018. Silver Boy Brand Tomato Catsup. Silver Boy Packing Co., N. Y. Made from sugar, spices, salt, vinegar, and benzoate of soda. Contents, 8 oz. Price, 10 cents.

H. L. B. 6040. C. H. L. 12019. Wilco Brand Tomato Catsup. Packed for Williams Bros. Co., Wilkes Barre, Pa. From whole, red, ripe tomatoes, pure spices, granulated sugar, distilled vinegar and salt. No artificial color. Net wt., 10 oz. Price, 10 cents.

H. L. B. 6041. C. H. L. 12020. Valley Brand Catsup. John L. Getz & Son, York, Pa. Made from tomatoes, spices, salt, vinegar, sugar and 1-10 of 1% sodium benzoate. Net wt., 4 oz. Price, 10 cents.

H. L. B. 6042. C. H. L. 12021. Frendell Brand Tomato Catsup. Distributed by Sprague, Warner & Co., Chicago, Ill. Made from tomatoes, distilled vinegar, granulated sugar, salt, onions, spices and garlic. Prepared without preservative. Contents, 8 oz. Price, 10 cents.

H. L. B. 6043. C. H. L. 12022. Wisco Brand Tomato Catsup. Witman, Schwartz Co., distributors, Harrisburg, Pa., Lewistown, Carlisle. Made from tomatoes, granulated sugar, onions, spices and vinegar. No chemical preservatives used. Contents, 9 oz. Price, 10 cents.

It is of interest to note, in this connection, that the price of ketchup is almost as variable as the names of the brands. There seems to be little or no attempt to standardize price and quantity simultaneously and we therefore see such extremes as 4 ounces for 10 cents and 7½ ounces for 5 cents or nearly four times as much in one case as in the other in proportion to the price paid. If we further take into consideration the amount of solid matter in the ketchup, we find the disparity even greater, for in the above example, the higher priced ketchup, instead of being richer in solids, is actually 20% lower.

The average price per ounce of ketchup is one cent. Now, taking the range of difference in total solids as compared in ketchups of equal price, we find variations all the way from 16.73% for the lowest to 35.32% for the highest or more than double the actual value in one case as compared with the other. Between the lowest residue found, which is 14.42%, and the highest, which is 37.20%, is a ratio of almost 3 to 1, while if we compare the prices and volumes of these two particular samples, we shall find that the lower priced articles contain slightly more actual value than the higher when reduced to the same unit of price comparison.

The following is the tabulated statement of the analytical data:

Chemist's Sample No.	Per cent. total solids.	Per cent. water soluble solids.	Per cent. acidity (calculated as acetic acid).	Color.	Preservative (calculated as sod. benzoate).	Microscopic examination.		
						Per cent. of fields showing moulds.	Yeasts and spores to each 1/60 cu. m. m.	No. of millions bacteria to each Cc.
11805,	22.61	21.05	1.68	O. K.	none	0	5	12
11806,	23.14	22.02	1.26	O. K.	none	10	3	28
11807,	19.45	16.80	1.02	O. K.	1.13	5	2	16
11808,	22.12	21.37	1.14	O. K.	0.127	0	1	16
11809,	26.99	25.35	1.62	O. K.	none	0	1	12
11810,	22.65	21.00	1.80	O. K.	0.127	1	2	32
11811,	27.65	26.44	1.62	O. K.	none	1	3	28
11812,	23.50	21.33	1.14	O. K.	none	0	2	18
11813,	29.26	28.25	1.62	O. K.	none	1	3	44
11814,	20.95	20.05	0.84	O. K.	none	0	1	14
11815,	19.01	17.05	1.14	O. K.	0.05	3	2	24
11816,	27.54	25.10	1.38	O. K.	0.17	0	1	38
11817,	18.29	16.29	0.90	O. K.	0.11	15	3	32
11818,	24.46	22.30	1.32	O. K.	0.118	0	1	22
11819,	18.75	17.45	0.90	O. K.	0.16	5	3	18
11821,	24.32	22.94	1.38	O. K.	none	0	1	35
11822,	15.68	14.24	0.72	O. K.	none	0	1	25
11823,	25.31	24.24	1.40	O. K.	none	0	1	25
11824,	20.12	18.43	0.78	O. K.	0.09	0	0	20
11825,	24.12	22.94	1.32	O. K.	0.10	0	2	40
11826,	19.58	17.01	1.26	O. K.	0.08	0	2	40
11827,	24.30	21.96	1.56	O. K.	none	0	2	50
11828,	30.36	28.72	1.62	O. K.	none	0	1	50
11829,	22.50	21.27	1.26	O. K.	none	0	1	60
11830,	23.49	20.00	1.50	O. K.	0.12	10	2	24
11831,	26.61	23.33	1.32	O. K.	0.13	0	1	12
11832,	24.94	23.40	1.62	O. K.	0.09	0	2	30
11833,	26.65	24.20	1.26	O. K.	0.113	0	1	18
11834,	30.06	.....	1.62	O. K.	none	0	1	25
11835,	29.56	.....	1.80	O. K.	none	0	2	40
11837,	21.38	19.41	0.54	O. K.	0.12	20	2	12
11838,	16.73	.....	1.26	O. K.	none	3	5	50
11872,	29.40	27.00	1.74	O. K.	none	0	2	32
11873,	22.98	19.34	1.20	O. K.	none	0	2	28
11874,	31.41	28.22	1.50	O. K.	none	1	6	28
11875,	22.48	20.00	1.80	O. K.	0.13	0	1	29
11876,	24.67	23.67	1.38	O. K.	none	0	0	14
11877,	26.28	25.22	1.74	O. K.	none	0	2	28
11878,	24.37	23.31	1.14	O. K.	0.20	0	4	24
11879,	25.03	23.37	1.74	O. K.	none	1	1	12
11880,	21.67	20.13	1.26	O. K.	0.03	0	3	18
11884,	24.40	23.46	1.36	O. K.	none	0	2	28
11885,	33.62	32.37	1.98	O. K.	none	0	0	8
11886,	32.66	30.41	1.56	O. K.	none	0	3	39
11887,	24.97	23.50	1.38	O. K.	none	0	1	10
11888,	18.56	17.60	1.08	O. K.	none	0	5	57
11889,	14.42	13.05	1.14	O. K.	none	1	2	21
11890,	29.37	27.84	1.50	O. K.	none	10	2	12
11891,	25.13	22.50	1.14	O. K.	none	1	2	21
11892,	18.33	17.00	0.84	O. K.	none	0	2	18
11900,	24.12	21.75	1.26	O. K.	0.135	0	4	62
11929,	28.16	26.00	1.62	O. K.	none	0	2	25
11930,	30.37	26.50	1.38	O. K.	none	0	4	21
11931,	21.03	19.05	0.78	O. K.	none	0	3	16
11932,	33.64	32.20	2.00	O. K.	none	0	0	10
11933,	28.10	26.30	1.68	O. K.	none	0	1	18
11934,	29.45	27.67	1.38	O. K.	none	0	3	18
11935,	29.40	28.51	1.44	O. K.	none	1	2	18
11936,	28.56	25.60	1.50	O. K.	none	0	2	25
11937,	18.00	16.70	0.78	O. K.	none	0	3	18
11938,	15.08	13.56	0.96	O. K.	none	10	4	32
11939,	21.11	21.0	1.20	O. K.	none	20	3	22
11940,	20.00	18.2	1.02	O. K.	none	1	5	49
11941,	19.65	18.54	1.50	O. K.	none	0	2	48
11942,	37.20	35.20	1.50	O. K.	none	0	4	26
11943,	31.71	29.86	1.57	O. K.	none	0	1	12
11944,	24.84	22.81	1.62	O. K.	none	1	5	18
11945,	16.30	14.48	0.48	O. K.	none	0	3	21
11946,	26.81	25.00	1.74	O. K.	none	0	2	58
11947,	17.61	15.46	1.14	O. K.	none	1	5	14
11948,	28.09	26.95	1.32	O. K.	none	5	2	27

Chemist's Sample No.	Per cent. total solids.	Per cent. water soluble solids.	Per cent. acidity (calculated as acetic acid).	Color.	Preservative (calculated as sod. benzoate).	Microscopic examination.		
						Per cent. of fields showing moulds.	Yeasts and spores to each 1/60 cu. m. m.	No. of millions bacteria to each Cc.
11949,	17.60	15.84	0.90	O. K.	none	1	3	48
11950,	22.37	19.10	1.50	O. K.	none	1	3	27
11951,	18.85	16.00	1.26	O. K.	none	5	2	18
11952,	26.81	25.69	1.32	O. K.	none	1	4	25
11953,	26.04	24.16	1.80	O. K.	none	1	5	38
11954,	28.94	26.17	1.80	O. K.	none	5	1	25
11955,	19.76	17.16	1.62	O. K.	none	5	2	70
11956,	28.18	26.45	1.20	O. K.	none	0	3	21
11957,	17.11	14.86	0.84	O. K.	none	0	1	24
11958,	21.78	19.34	1.50	O. K.	none	0	2	24
11959,	35.32	33.03	1.80	O. K.	0.12	0	1	16
11960,	18.70	16.40	1.02	O. K.	0.076	1	4	32
11961,	19.73	18.30	0.84	O. K.	0.09	5	2	18
11962,	22.63	20.70	1.44	O. K.	none	0	2	28
11963,	30.09	28.06	1.86	O. K.	none	0	2	21
11964,	23.14	21.20	1.20	O. K.	none	0	4	18
11965,	29.04	26.46	1.80	O. K.	none	1	1	21
11966,	20.53	18.20	0.90	O. K.	0.05	0	1	16
11967,	20.40	18.10	0.60	O. K.	none	0	4	24
11968,	19.67	17.40	1.08	O. K.	none	10	2	18
11969,	22.80	20.26	1.26	O. K.	none	2	1	18
11970,	29.83	28.64	2.10	O. K.	none	1	1	32
11971,	28.00	25.75	1.56	O. K.	none	0	0	12
11972,	30.37	28.96	1.74	O. K.	none	0	2	34
11973,	17.63	16.00	1.32	O. K.	0.13	0	1	18
11974,	19.41	18.38	0.78	O. K.	0.088	0	2	16
11975,	30.27	29.27	2.22	O. K.	none	0	3	21
11976,	20.00	19.23	1.08	O. K.	none	0	2	21
11977,	26.90	24.00	1.56	O. K.	none	0	1	21
11978,	31.23	28.98	1.80	O. K.	none	0	2	32
11979,	29.13	26.60	1.50	O. K.	none	5	3	32
11980,	22.57	20.71	1.26	O. K.	none	5	1	24
11981,	25.77	24.04	1.56	O. K.	none	0	2	34
11982,	28.23	25.23	2.34	O. K.	none	0	2	70
11983,	27.35	24.15	1.62	O. K.	none	1	1	27
11984,	18.40	15.00	1.02	O. K.	0.112	0	3	18
11985,	23.98	21.51	1.38	O. K.	none	0	2	14
11986,	19.70	17.00	1.38	O. K.	0.094	0	1	14
11987,	22.97	20.31	1.02	O. K.	none	0	5	28
11988,	29.78	28.07	1.26	O. K.	none	1	2	26
11989,	23.83	22.23	1.44	O. K.	none	0	2	18
11990,	20.60	18.92	1.26	O. K.	0.065	1	3	18
11991,	19.27	14.50	1.38	O. K.	none	0	1	24
11992,	18.42	15.80	1.20	O. K.	none	0	2	30
11993,	26.09	24.06	1.50	O. K.	none	0	2	25
11994,	28.70	27.95	1.68	O. K.	none	0	3	18
11995,	24.94	23.18	1.14	O. K.	none	1	2	16
11996,	25.57	23.45	1.26	O. K.	0.112	1	1	29
11997,	24.07	21.44	1.26	O. K.	none	1	3	26
11998	20.62	19.65	0.90	O. K.	none	0	2	21
11999,	22.63	20.87	1.20	O. K.	none	5	4	26
12000,	28.60	29.66	1.09	O. K.	none	0	4	18
12001,	29.37	28.16	2.16	O. K.	none	0	3	21
12002,	28.95	27.60	1.86	O. K.	none	0	2	18
12003,	32.60	31.52	2.56	O. K.	none	0	3	42
12004,	25.09	23.52	2.28	O. K.	none	0	5	48
12005,	20.15	18.38	1.56	O. K.	none	1	1	29
12006,	15.08	13.50	1.56	O. K.	none	10	2	21
12007,	25.15	22.50	1.20	O. K.	none	0	1	28
12008,	24.04	21.76	1.14	O. K.	none	0	4	28
12009,	17.91	15.17	0.84	O. K.	0.094	1	1	34
12010,	27.07	24.35	1.26	O. K.	none	0	3	24
12011,	20.34	18.50	1.08	O. K.	none	5	3	24
12015,	19.58	17.66	1.02	O. K.	none	1	2	24
12016,	24.71	23.00	1.38	O. K.	none	0	1	14
12017,	23.77	21.50	1.14	O. K.	none	0	2	38
12018,	24.82	22.66	1.32	O. K.	0.112	0	2	42
12019,	25.77	24.04	1.38	O. K.	none	5	4	25
12020,	18.70	17.60	0.90	O. K.	0.118	3	10	82
12021,	25.56	24.50	1.36	O. K.	none	1	2	28
12022,	30.09	28.92	1.50	O. K.	none	1	2	29

The figures for soluble matter have already been discussed in connection with the volume and price factors.

The most remarkable fact which attracts the attention is that in not one of the 142 samples was any artificial color found. This is quite a marked improvement over the results reported in Connecticut, where, as recently as 1910, 12% of the samples were found to be artificially colored.

Another fact, almost equally remarkable, is found that while in 1910 only 10% of the brands examined were found to be free from preservative, in the present examination only a total of 34 out of 142 or 24% were found to contain it, in every case benzoic acid being the substance found. The preservative is always added in the form of sodium benzoate, in which form it is declared upon the label. In the presence of the acetic acid, which is always found in ketchup, the benzoic acid is set free and it is found in the ketchup in the form of the free acid and not as the sodium salt.

It is also a noteworthy fact that only in 2 instances was a sufficient excess of benzoic acid found above the amount corresponding to 1/10 per cent. of sodium benzoate claimed, to warrant the charge of misbranding. It is also interesting to note that in no instance was any preservative found in a product which claimed to be free from it. No saccharin was found in any of the samples.

The underlying causes of this marked improvement with respect to preservatives in ketchup is likely due to the fact that manufacturers have found it cheaper in the end to maintain sanitary conditions and effect, through sterilization of the product, the desired end, than to depend upon the uncertain and questionable efficacy of a preservative. It is likely, too, that the ranks of the manufacturers who do not use preservatives will be still further increased in the near future if the European War continues, for the price of sodium benzoate has increased from less than 50 cents a lb. to over $5 and the cost of the sodium benzoate in a pint bottle of ketchup at present, is nearly as great as the cost of the tomatoes present. No manufacturer is so altruistic as to continue to use a constituent which adds so much to the manufacturing cost of his product, however much he may believe in its necessity and value, and the sodium benzoate controversy bids fair to be settled in a most interesting and unexpected manner.

The question of the acidity affords an interesting factor for study. It has often been claimed by the users and advocates of sodium benzoate that the manufacturers who did not employ any preservative were compelled to use large (and alleged injurious) amounts of vinegar or acetic acid and spices in order to preserve their product. In so far as the spices are concerned, there appears to be no essential difference between the samples containing preservative and those with-

out. As there is no accurate chemical method of determining small amounts of spices, this is a matter of opinion and not capable of proof. When it comes to the matter of acidity, however, we have an interesting series of figures. The average acidity of the samples containing sodium benzoate is 1.19% calculated as acetic acid. The average acidity of the unpreserved samples is 1.43% or less than 0.25% difference between the two classes. When we take the maximum and the minimum in each class we find that for the samples containing sodium benzoate the minimum acidity is 0.54 and the maximum 1.80, while for the unpreserved samples the minimum is 0.60 and the maximum 2.20. These differences are non-essential and effectually dispose of the contention that a high acidity is necessary in ketchups not preserved with sodium benzoate.

When we consider the figures shown by the microscopic examination, we are impelled to the conclusion that there has been a great improvement in this respect also. The figures for the microscopic factors, condensed and tabulated, are as follows:

	Per cent. of fields showing moulds.	Yeasts and spores to each 1/60 Cc.	Millions of bacteria to each Cc.
Maximum,	20	10	70
Minimum,	0	1	8
Average,	—2	3	26

When these figures are compared with those of the samples in which the U. S. Department of Agriculture has alleged decomposition, it will be seen that in no case would the figures warrant the supposition that the sample was in such a state of decomposition as to deserve prosecution. In some of the samples the figures point to a need for improvement in the conditions of handling, but in no instance do the figures indicate criminal negligence in this respect.

In conclusion, we would state that the foregoing investigation shows,

First, That an almost unparalleled improvement has occurred in the quality of the tomato ketchup of the market in the matter of the use of chemical preservatives. The percentage of purity, in the sense of freedom from preservatives in this respect, has risen from less than 6% in 1904 to over 75% in 1915.

Second, That the use of artificial coloration has entirely disappeared at the present time, whereas, in 1904, nearly 90% of the brands examined contained artificial color.

Third, That the allegations of the use of injurious amounts of acids and spices in brands containing no sodium benzoate has no basis in fact.

Fourth, That factory conditions have improved to the extent that not one sample out of 142 brands examined was found to be of an injurious character from the use of unsound materials which were formerly in common use.

Fifth, That only 2 samples out of 142, or less than 2%, were illegal in any respect, and in these instances it was probably a manufacturing error, for there was no reason for the presence of an excessive amount of preservation shown by a study of the microscopic character of the product.

Sixth, That saccharin was not found to be present in any of the samples examined.